

# PATENT ABSTRACTS OF JAPAN

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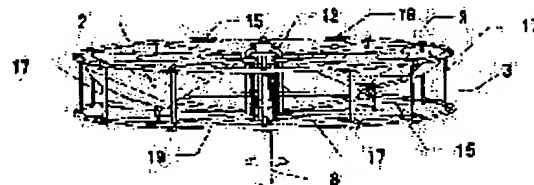
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(54) ROTOR OF ROTOR CRAFT PROVIDED WITH BLADES SUPPORTED BY TWO UPPER AND LOWER SPINDLE ARMS PROVIDED ON ROTOR SHAFT IN UPPER AND LOWER STAGES

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a rotor craft requiring no cycle pitch operation of rotor blades for propulsion flight.

SOLUTION: Blades having a flared planar shape such as a nearly fan shape are supported and fitted by two of the upper and lower spindle arms or upper and intermediate spindle arms displaced vertically and arranged radially at an optional pitch in the upper and lower stages on a rotor shaft as rotor of this rotor craft. The lift efficiency of the blades having a wide planar shape such as a nearly fan shape is remarkably improve, thus the length reach of the blades can be sharply shortened, and the rotation danger of the blades is largely improved.



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CLAIMS

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[Claim(s)]

the pivot arm of the upper case pivot frame which prepared the up-and-down level difference in the rotor shaft, and was attached around the pitch of arbitration, the pivot arm of a lower-berth reinforcement frame or the pivot arm of an upper case pivot frame, and the middle -- the rotary wing of the rotary-wing aircraft which carried out circumference wearing of the blade by passing over, and constituted the include angle in immobilization or adjustable two make it into the column of the pivot arm of a slide guide, and shifted that it was only perpendicular by the upper and lower sides.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the rotary wing of a rotary-wing aircraft.

[0002]

[Description of the Prior Art] The rotary-wing aircraft of the usual gestalt represented by the HEL had to obtain lift and a thrust to coincidence by the rotary wing. Although lift is acquired only by [ only giving \*\*\*\* to a blade and making it rotate ] being called a collective pitch control It is under [ which the blade to which a thrust is called a cyclic pitch control turns at high speed ] setting. In the minimum include angle and the back transverse plane, by carrying out the variation rate of the blade include angle violently continuously, blade \*\*\*\* was obtained and was flying by the \*\*\*\* device member called a swash plate at the front front made into the promotion direction so that blade \*\*\*\* might become the maximum include angle.

[0003]

[The technical problem which invention makes solution \*\*\*\*] The blade include angle in the inside of it of the rotor rotated at high speed to turn is set in a displacement \*\*\*\* cyclic pitch. Although the old blade is obliged to the blade configuration of the bamboo dragonfly form of reach with it since a torsion \*\*\*\* destructive load strong against the component of a blade occurs, [ narrow short surface width with a small torsion \*\*\*\* destructive load, and ] [ surely long to a longitudinal direction ] The rotary wing which consists of a blade of the bamboo dragonfly configuration of long reach is the \*\*\*\* weapon itself which flies while extracting and brandishing the sword of the body at high speed, and the plane crash of the rotary-wing aircraft by the contact damage on a rotary wing does not actually sever the back. Thus, the rotary wing in an old rotary-wing aircraft had a big problem in the continuous displacement of the blade include angle which serves as reach with the long bamboo dragonfly form blade of long reach from a cyclic pitch control itself.

[0004]

[Means for Solving the Problem] It developed as a premise that this invention used the model of rotary-wing aircraft as the rotary-wing aircraft of the pusher-propeller equipment which uses together the both sides of a pusher propeller and a rotary wing, and flies, and the cyclic actuation to which the variation rate of the include angle is continuously carried out while a rotor makes one revolution is not taken into consideration. It considers as the rotary wing of the structure which passed the blades of large flat-surface configurations with an arbitrary abbreviation sector etc. over two arms which are the upper case by which prepared the vertical level difference in the rotor shaft, and circumference wearing was carried out in the pitch of arbitration, the upper case and the lower berth of each arm in the lower berth and the middle, or an upper case, and the middle, and are made into a column, and which shifted that it was only perpendicular by the upper and lower sides, carried out circumference wearing, and basic structure is \*\*.

[0005]

[Embodiment of the Invention] Twelve division into equal parts etc. carries out the division-into-equal-parts rate of the plane area of the circle which constitutes the rotation range of a rotary wing arbitrarily, and this invention can be made to carry out support wearing with the pivot arm which prepared the level difference in the rotor shaft and installed the blade of the flat-surface configuration which forms the shape of an abbreviation sector of one division into equal parts in [ which carried out the division-into-equal-parts rate ] it, and the shape of an abbreviation sector of a maximum of two division into equal parts in it. A flat-surface configuration can constitute the rotary wing in which it has the plane area of a circle a maximum of 720 degrees with the blade which consists of an abbreviation sector of two division division into equal parts although the rotary wing with the blade which even division becomes from an equal abbreviation sector constitutes the plane area of the circle of 360 degrees. This invention consists of four examples, and a configuration member and an example are explained to a detail, referring to a drawing below.

[0006] The rotary wing which consists of the first example in this invention is explained. Explanation of the configuration member with which introduction and the first example are presented.

Light metal material, such as aluminum used as the heart of a blade as 1 and [ drawing 1 ] show, The flat-

surface configuration of the blade constituted by the FRP material used as an envelope. The inside which carried out the division-into-equal-parts rate of the plane area of the circle which forms the rotation range of a rotary wing arbitrarily [ 12 division into equal parts etc. ], To the cadaveric position of arbitration the first transition side on the basis of the hand of cut of the blade component which considers as the shape of an abbreviation sector which consists of the one division into equal parts or 2 division into equal parts, and consists of the shape of the abbreviation sector. As the blade (2) which consists of a hollow shaft method which is made into the applied part to a pivot arm, and which formed the bearing (1) which consists of a hollow shaft, and " drawing 2 " and " drawing 3 " show. The bearing (1) which is from a hollow shaft on the first transition side of the blade component on the basis of a hand of cut is formed. The blade frame (5) which formed the salient (3) which a cadaveric position is made to express from a blade envelope, and formed the bearing (4) which turns into the salient (3) from a hole or slitting and which consists of an aluminum plate etc. One point or two points, As the blade (2) of the compound method which carried out point installation, and " drawing 4 " show, are based on a hand of cut. The blade frame (5) which consists of an aluminum plate in which the salient (3) which formed the bearing (4) which becomes two places, protrusion and the cadaveric position of arbitration, from a hole, slitting, etc. was formed etc. As the blade (2) of the blade frame mode which comes to carry out a point array at proper spacing, and " drawing 5 " show to the whole blade. The blade (2) of the product made of cloth which rolled back the both ends by the side of the first transition of the cloth material by strengthening fiber, synthetic-resin material, etc. like a sail of a sailing boat or a web material and a trailing edge, and was used as the bearing (1) which consists of a centrum by sewing, adhesion, etc., or the method made from a sheet shall be prepared. Moreover, the blade (2) shown by " drawing 1 ", " drawing 2 ", " drawing 3 ", " drawing 4 ", and " drawing 5 " presupposes that the configuration, the configuration structure, and the wearing approaches of a blade of pivot welding directly the blade (2) which is what showed one example of a blade, in addition was constituted only from a plate of the aluminum of an abbreviation sector, and equipping it with it, such as an approach, are arbitrary. In addition, " drawing 4 " shows the blade frame (5) which omitted the envelope which consists of FRP etc. Thus, the blade (2) with which this invention is presented searches for flat-surface configurations with a larger arbitrary area of breadth, such as an abbreviation sector, at last.

As 2 and [ drawing 6 ] show, an upper case hub plate stop slot (6) lower-berth hub plate stop slot (7) is prepared, and it has this, and considers as the rotor shaft (8) of a rotary wing in locations which the shaft member which consists of arbitrary configurations means, such as a round shape and a polygon, respectively. As 3, [ drawing 7 ], and [ drawing 8 ] show, the flange which consists of the arbitrary configurations, thickness, and magnitude which make the start the round shape which formed the height in the center of the upper part is prepared. A vertical rotor shafting arrival hole (9) is prepared in the core of the prepared flange. Furthermore, the horizontal arm wearing screw hole (10) which goes to the central point and which is located on the radiation on the basis of the central point of a flange of the pitch number doubled with the number of blades with which it equips [  $12 /$  of the depth of arbitration ] is attached and prepared from the periphery end face of the thick section of the flange. Furthermore, Mikata, roppo, etc. have the number \*\*\*\* of arbitration, and this, and use as the hub plate (12) of a rotor shaft the screw hole (11) for immobilization of the depth in which even the horizontal rotor shafting arrival hole (9) which goes to the central point from a periphery end face leads to the central height of a flange. In addition, up formation or lower formation of a flange is sufficient as a central height. The ring-frame communicating pore (14) which consists of the hole or screw hole of the direction of a short hand is prepared in another side which prepares the wearing screw section (13) and is used as a tip while considering as the root of the bar which becomes the radius of the rotation range of the rotary wing set as arbitration from the aluminum of \*\*\*\*\* die length etc., as 4 and [ drawing 9 ] show, and it considers as a pivot arm (15) with this.

As 5 and [ drawing 10 ] show, the arm wearing hole (16) of a pivot arm (15) is prepared in monotonous both sides, such as aluminum of the die length to mean, and it considers as a vertical connection frame (17). It is the radius which consists of plates, such as aluminum, as 6 and [ drawing 11 ] show and which covers suitably even the tip of the pivot arm (15) with which the hub plate (12) was equipped, and moreover, the arm communicating pore (18) which consists of a path corresponding to the ring-frame communicating pore (14) prepared at least at the tip of a pivot arm (15) and a pitch is attached, and it considers as a ring frame (19). In addition, although the ring frame (19) shown by [ drawing 11 ] consists of frames of only the mere ring section, as [ drawing 12 ] shows, it can carry out reinforcement mitigation of the rotation load of the pivot arm (15) equipped with the ring frame (19), then blade (3) of the handle method connected with the handle (20) in which the rotor shafting arrival hole (9) was formed at the core.

As mentioned above, 123456 is the main component parts and member of a rotary wing which consist of the first example. The example of the first example is explained from this.

1 As [ drawing 13 ] shows, wearing immobilization of the hub plate (12) is carried out with a fixed screw (21) in the upper case hub plate stop slot (6) and lower-berth hub plate stop slot (7) on the rotor shaft (8), respectively

As 2 and [ drawing 14 ] show, all the arm wearing screwholes (10) attached around the hub plate (12) of an upper case at the radial are equipped with a pivot arm (15), it considers as an upper case pivot frame (22), all the arm wearing screwholes (10) attached around the hub plate (12) of the lower berth at the radial are equipped with a pivot arm (15) further succeeding, and it considers as a lower-berth reinforcement frame (23). In addition, the pivot arm (15) of an upper case pivot frame (22) hides caudad, and the pivot arm (15) of a lower-berth reinforcement frame (23) is located.

As 3 and [ drawing 15 ] show, passing-over insertion of the vertical connection frame (17) is carried out, and vertical connection is carried out at least at both roots of the pivot arm (15) of the upper case pivot frame (22) located in the same perpendicular grade made into a column, and the pivot arm (15) of a lower-berth reinforcement frame (23).

As 4 and [ drawing 16 ] show, on the pivot arm (15) used as single-tier eyes with an arbitrary upper case pivot frame (22) The bearing which consists of a hollow shaft by the side of the first transition of the blade (2) made into the first sheet (1), Or the bearing which equipped with the bearing (4) which consists of a hole, slitting, etc., and was further formed in the cadaveric position of the arbitration of the blade (2) set to one of them and which consists of a hollow shaft (1), The perpendicular grade which makes a column the bearing (4) which consists of a hole, slitting, etc. from the pivot arm (15) of the upper case pivot frame (22) used as a single-tier eye Or single-tier back, Or the pivot arm (15) of a lower-berth reinforcement frame (23) of arbitrary back trains, such as 2 train triplex-row back, is passed over and equipped.

As 5 and [ drawing 17 ] show, blades (2) are passed over the pivot arm (15) of all the remainder of the upper case pivot frame (22) by which attachment arrangement was carried out at the radial, and the pivot arm (15) of all the remainder of a lower-berth reinforcement frame (23) by train delivery one by one, and circumference wearing is carried out. And vertical connection frames (17) are passed over at least at all the tips located in the same perpendicular grade made into the column of the pivot arm (15) of the upper case pivot frame (22) equipped with a blade (2), and the pivot arm (15) of a lower-berth reinforcement frame (23), it equips, and vertical connection is carried out. Furthermore, the ring-frame communicating pore like the tip of all the pivot arms (15) of the upper case pivot frame (22) which carries out passing-over wearing of the blade (2) and by which at least the tip was connected with the root with the vertical connection frame (17) (14), Arm communicating pore (18) is made to agree, a ring frame (19) is bound with binding members, such as a bolt, to the ring-frame communicating pore (14) like the tip of all the pivot arms (15) of a lower-berth reinforcement frame (23), and it is equipped with it, respectively.

As mentioned above, it has 12345, and considers as the rotary wing which consists of the first example of the rotary-wing aircraft which consists of this invention. Thus, the rotary wing which consists of the first example is the example of the method which made \*\*\*\* of the blade (2) with which two make it into the column of the pivot arm (15) which prepared and attached the vertical level difference around the rotor shaft (8), and shifted that it was only perpendicular by the upper and lower sides were passed over and equipped fix to the fixed include angle of arbitration.

[0007] Next, the rotary wing by the second example which consists of this invention is explained. The configuration member with which introduction and the second example are presented is explained.

As 1 and [ drawing 18 ] show, it newly considers as the rotor shaft (8) of the lower-berth hub plate stop slot (7) in the rotor shaft (8) with which the first example was presented with which prepares a top-stretcher BURETO stop slot (24), and the rotary wing of the second example is presented caudad.

The flange which consists of arbitrary configurations, thickness, and magnitude which make the start the round shape which formed the height in the center of an inferior surface of tongue as [ drawing 19 ] and [ drawing 20 ] show, and to mean is prepared for 2 and a degree, and a vertical rotor shafting arrival hole (9) is prepared in the core of the prepared flange. Furthermore, the top-stretcher wearing projection screw section (25) of the number to mean is attached around the periphery end face of the thick section of the flange. And further, Mikata, roppo, etc. have the number \*\*\*\* of arbitration, and this, and use as a top-stretcher connection plate (26) the screw hole (11) of the depth in which even the horizontal rotor shafting arrival hole (9) which goes to the central point from a periphery end face leads to a flange inferior-surface-of-tongue central height. In addition, top-face formation of a flange is sufficient as a central height.

As 3, next [ drawing 21 ] show, it considers as the surface -- while -- \*\*\*\* -- To another side which prepares the connection member (28) which prepared the communicating pore (27) of the path corresponding to the pivot arm (15) of a lower-berth reinforcement frame (23), and is made into the lower side The connection member (28) which prepared the communicating pore (27) of the path corresponding to the top-stretcher wearing projection screw section (25) of a top-stretcher connection plate (26) is prepared. in addition -- and the top-stretcher frame (30) which consists of wire rods, such as bars which prepared the flexible controller material (29) which becomes the cadaveric position of arbitration from the combination function of a nut member and a bolt member such as aluminum, or piano wire, and a wire rope, is prepared. In addition, since suspension wearing of the top-stretcher frame (30) is carried out aslant, the connection member (28) of the surface of a top-stretcher frame

30) and the connection member (28) of the lower side shall be bent in a proper location by the include angle which gets used to the slanting suspension condition at a proper include angle. Furthermore, preparing the flexible controller material (29) which consists of a combination function of a nut member and a bolt member in the middle of the arbitration of a top-stretcher frame (30) So that the bowstring of stringed instruments, such as a guitar, may be made to become it tense with a sufficient degree and a tone may be tuned It is for establishing the best link condition as turgescence with the sufficient degree at the flexible controller material (29) of a top-stretcher frame (30) for the link condition of the members of each device in the device which constitutes a rotary wing which support and transmit a lift load especially, and maintaining.

The above is the configuration member of the rotary wing added in order that 123 might present the second example. Then, the example of the second example is explained. Since a basic configuration is based on the first example, explanation of the part which overlaps the first example is omitted and explained.

As 1 and " drawing 22 " show, wearing immobilization of the top-stretcher connection plate (26) is carried out in the top-stretcher plate stop slot (24) of the rotor shaft (8) which carries out passing-over wearing of the blade (2), and becomes by the upper case pivot frame (22) and the lower-berth reinforcement frame (23).

The pivot arm (15) of the top-stretcher connection plate (26) by which wearing immobilization was carried out, and the lower-berth reinforcement frame (23) which comes to carry out passing-over wearing of the blade (2) is connected with 2 and a rotor shaft (8) with a top-stretcher frame (30). As mentioned above, it has the device which consists of 12, and considers as the second example of the rotary wing which consists of this invention. The rotary wing which consists of the second example is the example which reinforced with the top-stretcher frame (30) the lift load of a blade (2) with which the plane area increased, when a rotary wing is made into a major diameter. In addition, even if it equips the rotary wing of a minor diameter with a top-stretcher frame (30), it is completely that of a furnace trap potato.

[0008] Next, the rotary wing by the third example which consists of this invention is explained. The configuration member with which introduction and the third example are presented is explained.

It considers as the rotor shaft (8) which newly prepared the outside screw section (31) in the arbitrary fixed range of the lower part of the lower-berth hub plate stop slot (7) in the rotor shaft which presented the first example with 1 and a rotor shaft (8) as [ drawing 23 ] showed.

As 2, [ drawing 24 ], and [ drawing 25 ] show, in the center of the flange which consists of proper thickness The rotor-shaft insertion hole (32) of the path which agrees in \*\*\*\* in which the vertical slide to a rotor shaft (8) is possible is prepared. in addition — and, although prepare a number which went to the monotonous core from the periphery end face in the thickness of the flange of pivot arm wearing screwholes (33) which a radial means, it has this, it considers as a vertical slide hub plate (34) and a drawing is shown further below the pivot arm (15) of the die length which reaches the bearing (4) which was formed in the cadaveric position of the arbitration of a blade (2) at the vertical slide hub plate (34), and which consists of a hole or slitting — all pivot arm wearing screwholes (33) — equipping — the middle — it considers as a slide guide (35).

As 3 and [ drawing 26 ] show, a spring coil (36) is prepared.

As 4, [ drawing 27 ], and [ drawing 28 ] show, a height is prepared in the center of the upper part, and the flange which makes the outside of the height the disk section is prepared. And a vertical rotor-shaft insertion hole (32) is prepared in the core of the prepared flange. Furthermore, the top-stretcher wearing projection screw section (25) located on the production of the radial from a number of cores of a flange to mean is prepared in the periphery end face of the height of the center of the upper part which prepared the rotor-shaft insertion hole (32). And they are the number \*\*\*\*\* of arbitration, such as a three way or four directions, and five directions, further about the horizontal stop pawl wearing hole (37) which reaches from a disk periphery end face in the thickness of the disk section at a rotor-shaft insertion hole (32). Furthermore, the stop pawl slide guide insertion hole (38) of the fixed die-length range of vertical installed through the installation location of the stop pawl wearing hole (37) of the disk section of a flange is prepared. Furthermore, a pilot pin (39) is installed in the four way type of the arbitration of the inferior surface of tongue of the disk section of a flange. Next, the stop pawl (42) which comes to attach a push spring (41) in another side which considers as a pawl, prepares a slide guide hole (40) in the middle fixed range, and is used as the back end while considering as a tip is prepared. And insertion wearing of the stop pawl (42) is carried out at the stop pawl wearing hole (37) of the flange prepared previously. Next, a rotor-shaft insertion hole (32) is prepared in a core, and a pilot-pin insertion hole (43) is prepared in the location corresponding to the stowed position of a pilot pin (39). Furthermore, the stop discharge plate (45) which prepared the guide pin (44) in the location corresponding to the slide guide hole (40) of a stop pawl (42) is prepared. And further, a pilot pin (39) is equipped with a push spring (41), and the pilot pin (39) which comes to equip the push spring (41) is made to carry out agreement insertion wearing of the pilot-pin insertion hole (43), a stop discharge plate (45) is attached in it, and it has this in it, and considers as a swash plate (46). Although [ drawing 29 ] omits detailed explanation, it shows an example of a control link of the above-mentioned swash plate (46).

As mentioned above, 1234 is the main additional configuration members with which the third example is



presented. In addition, the structure of the above-mentioned swash plate (46) shall be one example of a configuration of a swash plate, in addition shall be constituted by arbitration, such as an oil hydraulic system configuration and a motor method configuration. The example of the third example is explained succeeding. It is what showed the plane configuration situation of a pivot frame (15) that introduction and [ drawing 30 ] are easier to understand the third example as a plane reference drawing. most — an outside circle — the ring frame (19) of an upper case pivot frame (22) — outside to the second circle — the middle — it is the ring frame (19) of a slide guide (35) — in addition, an upper case pivot frame (22) hides caudad, and a lower-berth reinforcement frame (23) exists. furthermore, the middle — the pivot arm (15) of a slide guide (35) is arranged in the location located in the middle of the pivot arm (15) of an upper case pivot frame (22).

As 1 and [ drawing 31 ] show, wearing immobilization of the upper case pivot frame (22) which equipped the upper case hub plate stop slot (6) on the rotor shaft (8) with the pivot arm (15) is carried out. the middle of the upper case pivot frame (22) in 2 and a rotor shaft (8) which carried out attachment wearing of the pivot arm (15) caudad — it equips with a slide guide (35).

the middle in 3 and a rotor shaft (8) — a slide guide (35) — it equips with a coil spring (36) caudad.

Wearing immobilization of the lower-berth reinforcement frame (23) which equipped the lower-berth hub plate stop slot (7) in 4 and a rotor shaft (8) with the pivot arm (15) is carried out.

Vertical connection frames (17) are passed at least over the root of the pivot arm (15) of the upper case pivot frame (22) located in the same vertical position made into 5 and a column, and the pivot arm (15) of a lower-berth reinforcement frame (23), and vertical connection is carried out.

The bearing which becomes the pivot arm (15) used as single-tier eyes with arbitrary 6 and upper case pivot frame (22) from the hollow shaft by the side of the first transition of the blade (2) made into the first sheet (1), or the bearing (4) which consists of a hole, slitting, etc. — equipping — in addition — and The bearing (4) which consists of a hole prepared in the cadaveric position [ of the arbitration of the blade (2) set to oneth of them ], or trailing-edge side, slitting, etc. the middle of the back trains with single-tier back or 2 train triplex-row back arbitrary at least in it being perpendicular etc. made into a column from the pivot arm (15) of the upper case pivot frame (22) used as a single-tier eye — the pivot arm (15) of a slide guide (35) is passed over and equipped.

the pivot arm (15) of all the remainder of the upper case pivot frame (22) by which attachment arrangement was carried out at 7 and a radial, and the middle — passing-over circumference wearing of the blade (2) is carried out by train delivery one by one at the pivot arm (15) of all the remainder of a slide guide (35).

At least at the tip located in the same perpendicular grade made into the column of all the pivot arms (15) of the upper case pivot frame (22) equipped with 8 and a blade (2), and all the pivot arms (15) of a lower-berth reinforcement frame (23), passing-over wearing of the vertical connection frame (17) is carried out, and vertical connection is carried out.

9 and all the pivot arms of the upper case pivot frame (22) equipped with a blade (2) (15), It equips with a ring frame (19) at least at each tip of all the pivot arms (15) of a slide guide (35), and all the pivot arms (15) of a lower-berth reinforcement frame (23). the middle — an upper case pivot frame (22) and the middle — horizontal connection of a slide guide (35) and the lower-berth reinforcement frame (23) is carried out, respectively, and it unifies.

The outside screw section (31) in 10 and a rotor shaft (8) is equipped with a swash plate (46).

11 and the middle — a swash plate (46) is connected with the pivot arm (15) of a slide guide (35) with a top-stretcher frame (30). In addition, the coil spring (36) pushed up the blade (2) up, and has closed blade \*\*\*\*.

As mentioned above, it has 123456789 10 11, and considers as the rotary wing which consists of the third example. the rotary wing which consists of the third example — the include angle of a blade (2) — the middle — it is the example which could be made to carry out actuation control in a slide guide (35) as adjustable.

[0009] The fourth example which consists of this invention is explained. Introduction and a configuration member are explained. Although there is no addition of a configuration member, additional formation of the stop slot (47) of a top-stretcher connection plate is newly carried out in the upper part of a swash plate (46) in the rotor shaft (8) with which the third example was presented. Then, the example which consists of the fourth example is explained.

As 1 and " drawing 32 " show, wearing immobilization of the top-stretcher connection plate (26) is carried out in the top-stretcher connection plate stop slot (47) in the rotary-wing device setting up was finished to the condition which showed the top-stretcher connection plate stop slot (47) to the rotor shaft (8) which carried out additional formation in the third example.

A lower-berth reinforcement frame (23) is connected with 2 and a top-stretcher wearing plate (26) with a top-stretcher frame (30).

As mentioned above, it has 12 and considers as the rotary wing which consists of the fourth example. The rotary wing which consists of the fourth example is the example which took the cure for reinforcing the lift load which blade (2) receives, when the rotary wing which can carry out actuation control of the include angle of a blade (2).

s made into a major diameter. In addition, the installation location of a top-stretcher frame (30) and a vertical connection frame (17) shall set up freely the proper location of arbitration besides the connection method in the location shown by " drawing 22 " and " drawing 23 ."

[0010]

[Effect of the Invention] Since the blade of a plane area with a large abbreviation sector etc. is constituted by passing over and equipping with a blade two make it into the column of the pivot arm which prepared and attached the up-and-down level difference around the rotor shaft and shifted that it was only perpendicular by the upper and lower sides and a large plane area raises lift effectiveness by leaps and bounds, the rotary wing of the rotary-wing aircraft which consists of this invention can shorten blade reach. The safety to the plane crash by contact of a result and a rotary wing is improved greatly. Manufacture of a very compact rotary-wing aircraft is attained. moreover, since the rotary-wing aircraft represent by the conventional HEL focus and require an airframe, all crew weight loads, and the rotation load of a blade for the connection pin of the hub plate which connected the blade and the rotor shaft on the structure, the functional burden on the structure be beyond in imagination, and be just deposit a life and insurance with one thin lifeline-component. The rotary wing which consists of this invention was fixed to the rotor shaft (8) to it. By two or more top-stretcher frames (30) connected with two or more upper case pivot frames (22), the lower-berth reinforcement frame (23), and the top-stretcher connection plate (26) fixed to the rotor shaft (8) still the more nearly same Since it has structure which carries out distributed support of the airframe and crew's weight load which are applied to a blade (2) by the whole rotary-wing configuration member which makes a rotor shaft (8) the start, and the rotation load of a blade (2) by the whole rotary wing, an airframe, crew's life, and insurance are guarded by duplex Mie. Furthermore, since the rotary wing with the short reach of the blade (2) which consists of this invention is the device in which staying-in-the-air lift is acquired with medium-speed rotation extent in the blade (2) of the short reach moment unlike rotating the blade of the long reach moment by ultra high-speed like the conventional rotary wing, it reduces an engine output load greatly, prevents a result and an engine trouble beforehand, and, moreover, it not only prevents the minor collision of a rotary wing, but raises fuel consumption effectiveness. Furthermore, since it can soft-land according to the parachute rotation effectiveness of the rotary wing which consists of a large plane area of this invention limited to the staying-in-the-air function even if an engine trouble should occur on an airframe and a flight KON trawl should lapse into impossible, the worst situation of crash is prevented. furthermore, an engine -- the object for pusher propellers, and the object for rotary wings -- respectively -- separate loading -- carrying out -- in addition -- and the rotary-wing aircraft, then safety in which an output is possible improve still by leaps and bounds bidirectionally.

[0011]

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

The scale of each drawing shown below is not unified.

[Drawing 1] The top view having shown the blade (2) which formed the bearing (1) which consists of a hollow shaft.

[Drawing 2] The top view which consists of a combination method of the blade frame (5) which carried out salient (3) formation which formed the bearing (1) which consists of a hollow shaft, and the bearing (4) which consists of a hole, slitting, etc. and in which having shown the blade (2).

[Drawing 3] The side elevation which consists of a combination method of the blade frame (5) which carried out salient (3) formation which formed the bearing (1) which consists of a hollow shaft, and the bearing (4) which consists of a hole, slitting, etc. and in which having shown the blade (2).

[Drawing 4] The perspective view having shown having carried out point arrangement of the blade frame (5) which carried out salient (3) formation which formed the bearing (4) which becomes two points, the front and a cadaveric position, from a hole, slitting, etc.

[Drawing 5] The perspective view having shown the blade (2) which consists of cloth or a web material.

[Drawing 6] The perspective view having shown the rotor shaft (8).

[Drawing 7] The top view having shown the hub plate (12).

[Drawing 8] The side elevation having shown the hub plate (12).

[Drawing 9] The perspective view having shown the pivot arm (15).

[Drawing 10] The perspective view having shown the vertical connection frame (17).

[Drawing 11] The perspective view having shown the ring frame (19).

[Drawing 12] The perspective view having shown the ring frame (19) of a handle method.

[Drawing 13] The side elevation having shown having equipped with the hub plate (12) of two steps of upper and lower sides the rotor shaft (8) with which the first example is presented.

[Drawing 14] The top view having shown the upper case \*\*\*\* frame (22).

[Drawing 15] The side elevation having shown the upper case \*\*\*\* frame (22) with which the rotor shaft (8) was equipped, and the lower-berth reinforcement frame (23).

[Drawing 16] the upper case \*\*\*\* frame (22) with which the rotor shaft (8) was equipped, and a lower-berth reinforcement frame (23) — a vertical connection frame (17) — passing over — in addition — and the side elevation having shown the assembly way until it carried out insertion wearing of the bearing (1) which becomes the pivot arm (15) of an upper case \*\*\*\* frame (22) from the hollow shaft by the side of the first transition of a blade (2).

[Drawing 17] The perspective view having shown the outline of the rotary wing of this invention which consists of the first example. In addition, since the configuration detail section will hide if the account of drawing of all the wearing of a blade (2) is carried out, only the blade (2) of the about for right and left is illustrated.

[Drawing 18] The perspective view having shown the rotor shaft (8) with which the second example is presented.

[Drawing 19] The top view having shown the top-stretcher connection plate (26)

[Drawing 20] The side elevation having shown the top-stretcher connection plate (26)

[Drawing 21] The perspective view having shown the top-stretcher frame (30)

[Drawing 22] The perspective view having shown the outline of the rotary wing of this invention which consists of the second example. In addition, since the configuration detail section will hide if the account of drawing of all the wearing of a blade (2) is carried out, only the blade (2) of the about for right and left is illustrated.

[Drawing 23] The side elevation having shown the rotor shaft (8) with which the third example is presented.

[Drawing 24] the middle -- the top view having shown the slide guide (35).

[Drawing 25] the middle -- the side elevation having shown the slide guide (35).

[Drawing 26] The side elevation having shown the coil spring (36).

[Drawing 27] The top view having shown the swash plate (46).

[Drawing 28] The side elevation having shown the swash plate (46).

Drawing 29] The side elevation of reference having shown an example of a control link to a swash plate (46).

Drawing 30] the upper case pivot frame (22) with which the third example is presented, and the middle — the top view of reference having shown the physical relationship of arrangement in the flat surface of a slide guide (35).

Drawing 31] an upper case pivot frame, and (22) and the middle — the side elevation having shown the rotary wing which consists of the third example which enabled include-angle modification of the blade (2) in which passing-over wearing was carried out by the slide guide (35) with the swash plate (46). In addition, in order to make a drawing clear, the account of drawing of the blade (2) is only really carried out, and others are omitted.

Drawing 32] The side elevation having shown the rotary wing which consists of the fourth example. In addition, in order to make a drawing clear, the account of drawing of the blade (2) is only really carried out, and others are omitted.

[Description of Notations]

- 1 Bearing Which Consists of a Hollow Shaft
  - 2 Blade
  - 3 Salient
  - 4 Bearing Which Consists of a Hole, Slitting, Etc.
  - 5 Blade Frame
  - 6 Upper Case Hub Plate Stop Slot
  - 7 Lower-Berth Hub Plate Stop Slot
  - 8 Rotor Shaft
  - 9 Rotor Shafting Arrival Hole
  - 10 Arm Wearing Screwhole
  - 11 Screwhole
  - 12 Hub Plate
  - 13 Wearing Screw Section
  - 14 Ring-Frame Communicating Pore
  - 15 Pivot Arm
  - 16 Arm Wearing Hole
  - 17 Vertical Connection Frame
  - 18 Arm Communicating Pore
  - 19 Ring Frame
  - 20 Handle
  - 21 Fixed Screw
  - 22 Upper Case Pivot Frame
  - 23 Lower-Berth Reinforcement Frame
  - 24 Top-Stretcher Plate Stop Slot
  - 25 Top-Stretcher Wearing Projection Screw Section
  - 26 Top-Stretcher Connection Plate
  - 27 Communicating Pore
  - 28 Connection Member
  - 29 Flexible Controller Material
  - 30 Top-Stretcher Frame
  - 31 Outside Screw Section
  - 32 Rotor-Shaft Insertion Hole
  - 33 Pivot Arm Wearing Screwhole
  - 34 Vertical Slide Hub Freight
  - 35 Middle — Slide Guide
  - 36 Coil Spring
  - 37 Stop Pawl Wearing Hole
  - 38 Stop Pawl Slide Guide Insertion Hole
  - 39 Pilot Pin
  - 40 Slide Guide Hole
  - 41 Push Spring
  - 42 Stop Pawl
  - 43 Pilot-Pin Insertion Hole
  - 44 Guide Pin
  - 45 Stop Discharge Plate
  - 46 Swash Plate
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Translation done.]

\* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

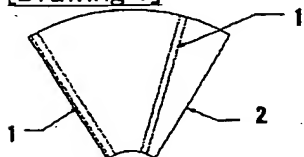
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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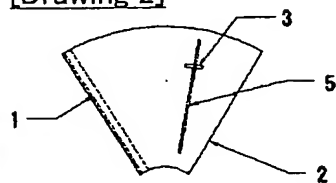
DRAWINGS

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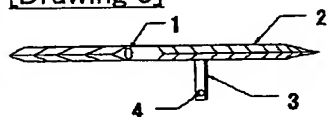
[Drawing 1]



[Drawing 2]



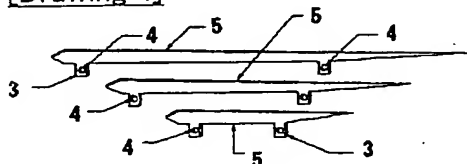
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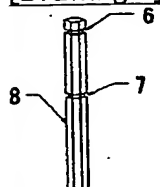
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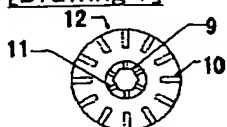
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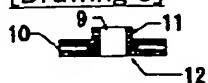
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[Drawing 7]



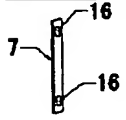
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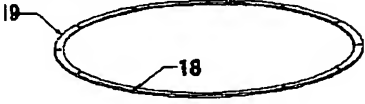
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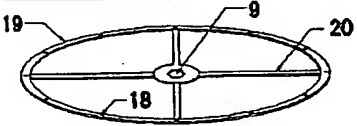
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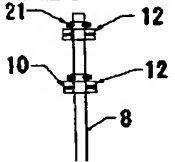
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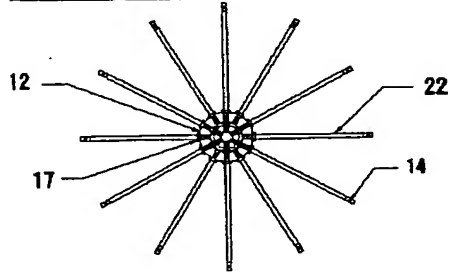
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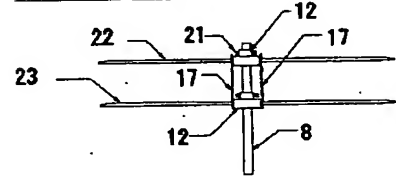
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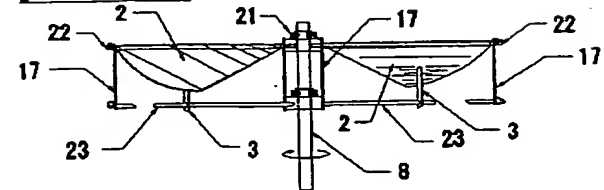
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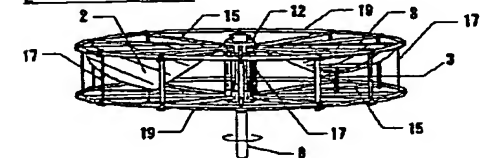
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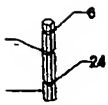
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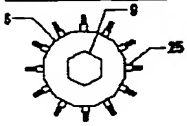
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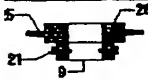
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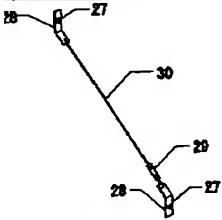
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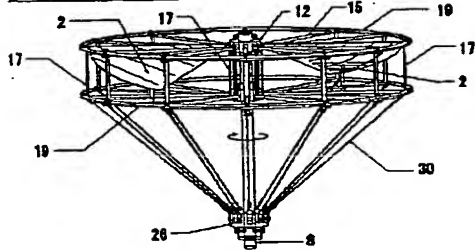
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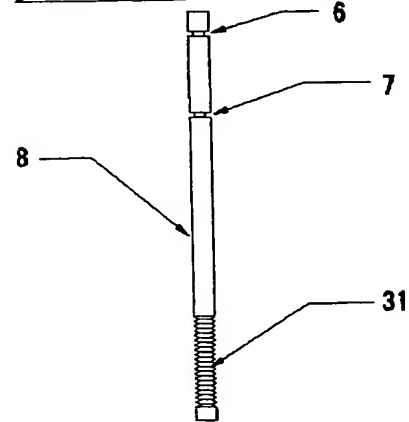
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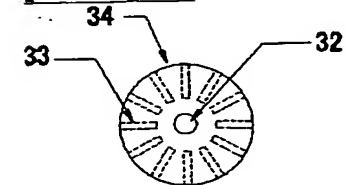
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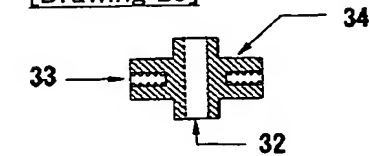
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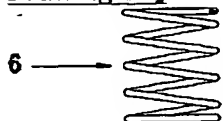
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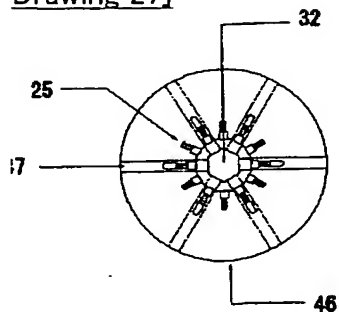
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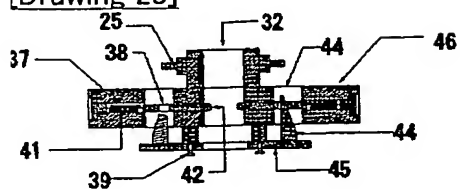
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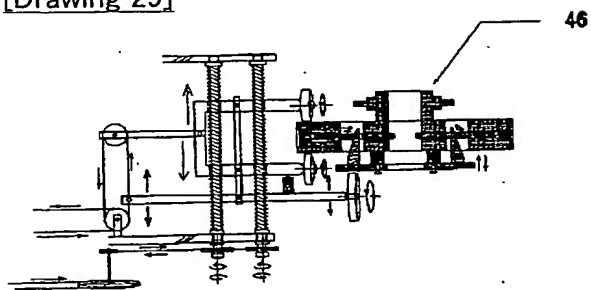
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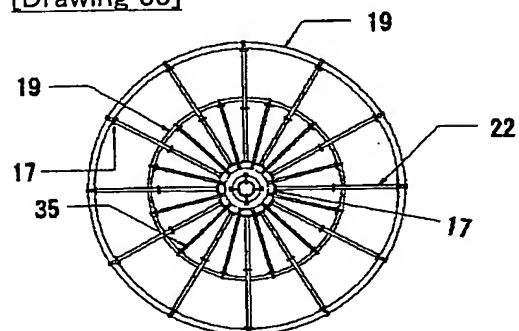
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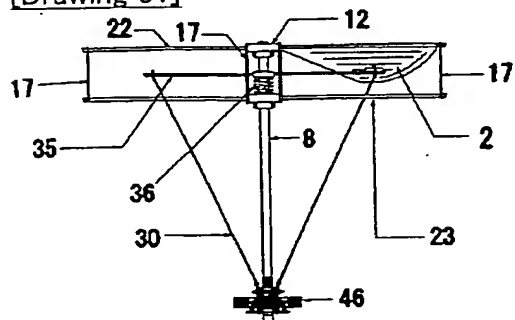
[Drawing 29]



[Drawing 30]

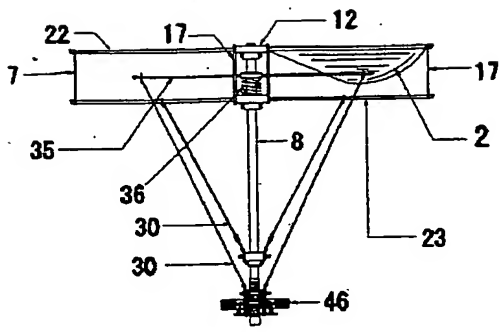


[Drawing 31]



[Drawing 32]





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